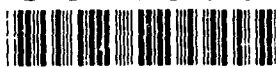**US Army Corps
of Engineers**
Waterways Experiment
Station

AD-A284 650

User's Guide for the Littoral Environment Observation (LEO) PC Data Retrieval and Analysis System

by   *Leonette J. Thomas*

94-30319

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User's Guide for the Littoral Environment Observation (LEO) PC Data Retrieval and Analysis System

by Leonette J. Thomas

U.S. Army Corps of Engineers
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3909 Halls Ferry Road
Vicksburg, MS   39180-6199

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Final report

Approved for public release; distribution is unlimited
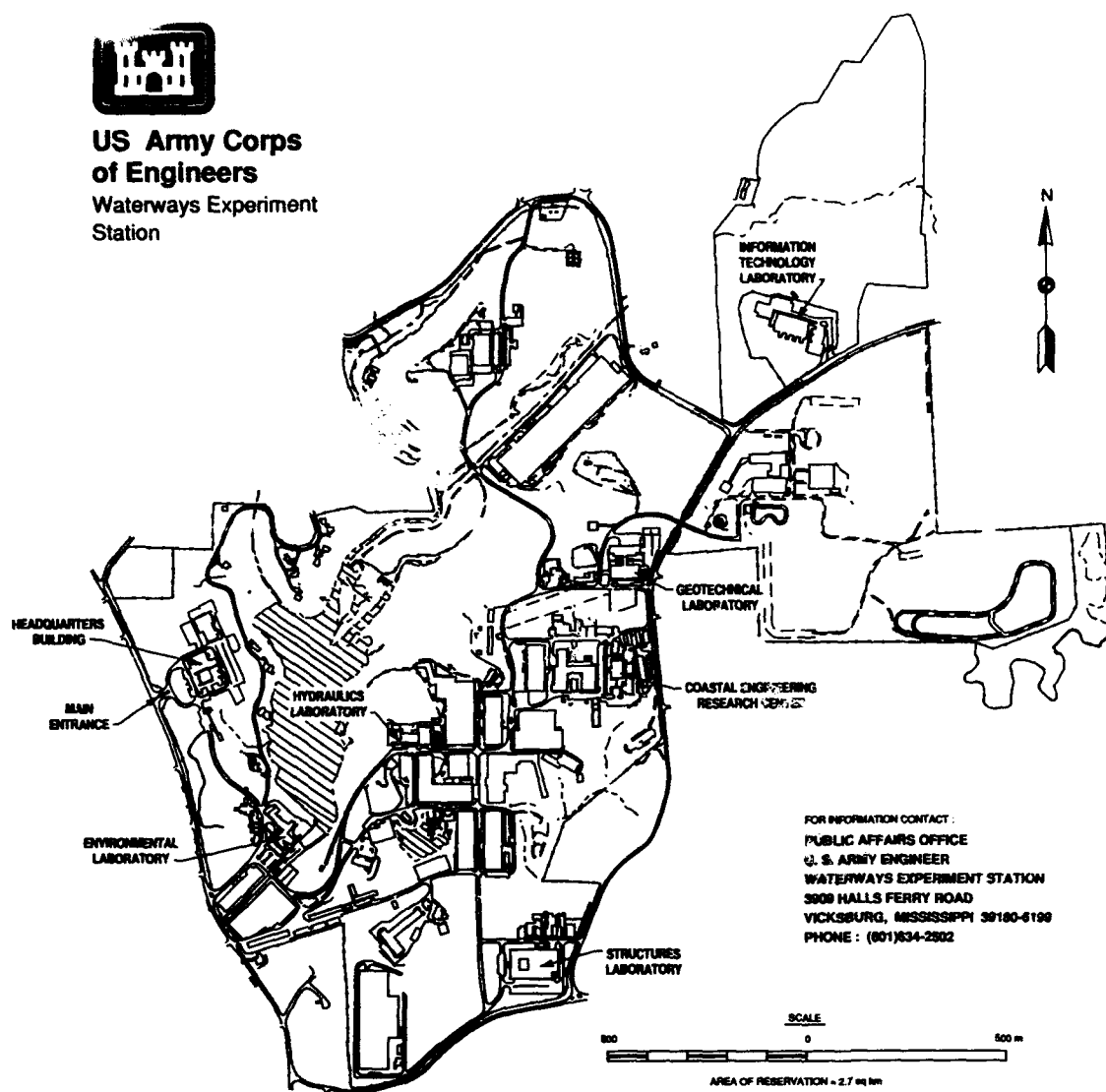
Prepared for   U.S. Army Corps of Engineers
Washington, DC   20314-1000

**US Army Corps
of Engineers**
Waterways Experiment
Station

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SCALE

AREA OF RESERVATION = 2.7 sq km

Contents

Preface

In 1991, a decision was made to move the Littoral Environment Observation (LEO) Program from a mainframe computer environment to a personal computer- (PC-) based environment. This project was initiated at the U.S. Army Engineer Waterways Experiment Station (WES) under the authorization of the U.S. Army Corps of Engineers (USACE) as part of the Coastal Field Data Collection Program managed by the WES Coastal Engineering Research Center (CERC). Messrs. John G. Housley, Barry W. Holliday, and John H. Lockhart, Jr., USACE, are Technical Monitors for the Coastal Field Data Collection Program; Ms. Carolyn Holmes, CERC, is Program Manager.

This report was prepared by Ms. Leonette J. Thomas, Wave Processes Branch (WPB), Wave Dynamics Division (WDD), CERC. Conversion of the FORTRAN code from one operating system to the other was performed by Ms. Thomas and Messrs. Dean Taylor and James Jefferson of the Systems Modernization Unit, Computer Science Division, Information Technology Laboratory, WES.

The report was prepared under the direct supervision of Mr. William C. Seabergh, Principal Investigator, WPB, Mr. Dennis Markle, Chief, WPB, and Mr. Gene Chatham, Chief, WDD; and under the general supervision of Dr. James R. Houston, and Mr. Charles C. Calhoun, Jr., Director and Assistant Director, respectively, CERC.

At the time of publication of this report, COL Bruce K. Howard, EN, was Commander of WES and Dr. Robert W. Whalin was Director.

Conversion Factors,
Non-SI to SI Units of Measurement

Non-SI units of measurement used in this report can be converted to SI units as follows:

Multiply	By	To Obtain
cubic yards	0.7645549	cubic meters
degrees (angle)	0.01745329	radians
feet	0.3048	meters
inches	0.0254	meters
miles (U.S. nautical) per hour	1.852	kilometers per hour

1 Introduction

As part of its mission, the U.S. Army Corps of Engineers has responsibility for design and construction of coastal protection works that are both functionally and structurally successful. In order to fulfill this mission, coastal engineers require information on the oceanographic and meteorologic forces that affect the coast. The Littoral Environment Observation (LEO) Program was established to provide this information in areas where gauges and other data collection methods are not feasible due to cost or accessibility.

Background

In 1966, the U.S. Army Engineer District, San Francisco, asked the Coastal Engineering Research Center (CERC), U.S. Army Engineer Waterways Experiment Station (WES), to participate in a cooperative data collection program with the State of California, Division of Beaches and Parks. The agencies agreed that CERC would study, catalogue, and analyze data, and the State of California agreed to furnish personnel to collect data on a regular basis (Smith and Wagner 1991).

Since that time, the LEO Program has been used to monitor coastal processes along the east coast (DeWall 1977, Schneider 1978), the Great Lakes coasts (Bruno and Hiipakka 1973), and the Gulf Coast of the United States (Balsillie 1975). Currently, the program has collected data at over 350 sites.

During 1991, WES's contract with Control Data Corporation (CDC) Cybernet Network System in Rockville, Maryland, was terminated. This system housed the LEO database and programs. A decision was made to transfer the LEO retrieval system to the WES CDC System. After doing so, some problems occurred with incompatibility of the operating system. It was proposed that the code be made operational in the personal computer (PC) mode, thereby allowing it to be universal to all Corps users.

Data Collection

LEO data observations are recorded on the form shown in Figure 1. Because there was a great demand for beach width information, this parameter was added to the form in 1992. Beach width measures to the nearest foot the distance of the most seaward beach berm crest from a reference point. Figure 2 provides a visual definition of terms describing a typical beach profile. Other parameters include the station identification number, wave period, breaker height, wind speed, and surf zone width. A complete description of the LEO data collection process, excluding the beach width parameter, can be found in Schneider (1981).

LEO data, because of its extremely large size, is divided into Corps Divisions and placed on diskettes for easier access by the user. Files are compressed on the diskettes using PKZIP software.

LITTORAL ENVIRONMENT OBSERVATIONS
RECORD ALL DATA CAREFULLY AND LEGIBLY

SITE NUMBERS 1 2 3 4 5

YEAR 6 7

MONTH 8 9

DAY 10 11

TIME 12 13 14 15

WAVE PERIOD

Record the time in seconds for eleven (11) wave crests to pass a stationary point. If calm record 0.

16 17 18

BREAKER HEIGHT

Record the best estimate of the average wave height to the nearest length of a foot.

19 20 . 21

WAVE ANGLE AT BREAKER

Record to the nearest degree the direction the waves are coming from using the protractor on the following page. 0 if calm

22 23 24

WAVE TYPE

0-Calm   3-Surging
1-Spilling   4-Spill/Plunge
2-Plunging

25

WIND SPEED

Record wind speed to the nearest mph. If calm record 0.

26 27

WIND DIRECTION

Direction the wind is coming.

1-N   3-E   5-S   7-W   0-Calm
2-NE   4-SE   6-SW   8-NW

28

FORESHORE SLOPE

Record foreshore slope to the nearest degree.

29 30

WIDTH OF SURF ZONE

Estimate in feet the distance from shore to breakers, if calm record 0.

31 32 33 34

LONGSHORE CURRENT

DYE

Estimate distance in feet from shoreline to point of dye injection.

36 37 38

CURRENT SPEED

Measure in feet the distance the dye patch is observed to move during minute period; if no longshore movement record 0.

43 44 45

CURRENT DIRECTION

0 No longshore movement
+1 Dye moves toward right
-1 Dye moves toward left

46 47

Figure 1. LEO recording form (Continued)

RIP CURRENTS

If rip currents are present, indicate spacing (feet). If spacing is irregular estimate average spacing. If no rips record 0.

☐☐☐
48 50 51 52

BEACH CUSPS

If cusps are present, indicate spacing (feet). If spacing is irregular estimate average spacing. If no cusps record 0.

☐☐☐
54 55 56

BEACH WIDTH

Measure the distance of the most seaward Beach Berm crest from a reference point to the nearest foot.

☐☐☐☐
57 58 59 60

PLEASE PRINT:

_____   _____
SITE NAME   OBSERVER

Please Check The Form For Completeness

REMARKS: _____

_____
_____
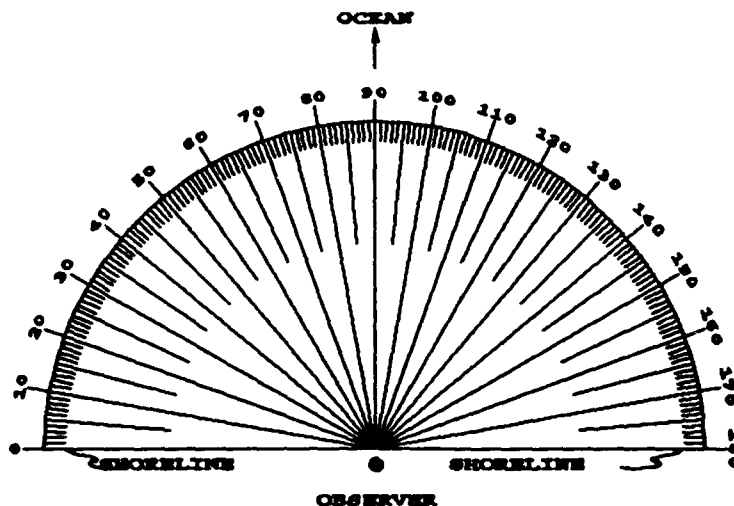
NOTE: If a pier is used for an observation platform: place 0-180 line on the rail parallel to the centerline of the pier, sight along the crest of the breaking waves and record the angle observed

Figure 1. (Concluded)
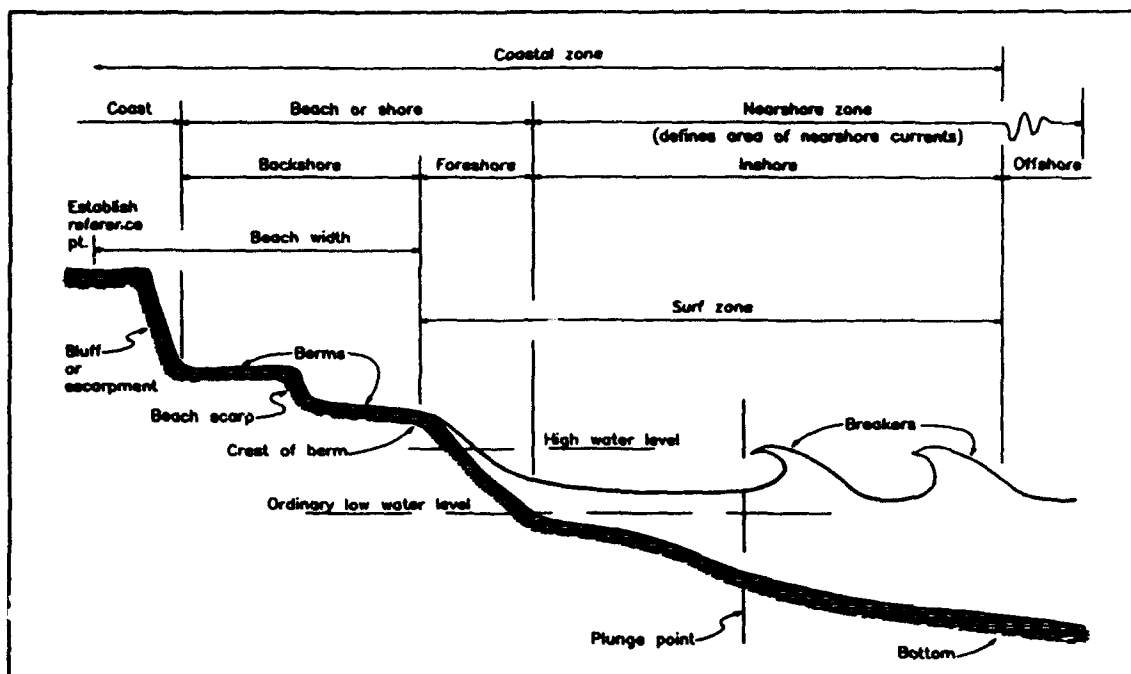
Figure 2. Visual definition of terms describing a typical beach profile

2 Description of the LEO PC Data Retrieval and Analysis System

The LEO PC Data Retrieval and Analysis system performs data retrieval and data analysis, and processes reports. It was designed to be user-friendly, with various help screens appearing throughout the program. The system produces statistical reports that may be displayed on screen or directed to a printer.

The LEO PC system was restructured and compiled using LAHEY F77L FORTRAN. The LEO database was originally stored on magnetic tapes according to shoreline (for example, data from the states of California and Washington were stored with west coast data). When the system was transferred to the PC, magnetic tapes could no longer be used as a means of accessing the data. The files in their previous form were too enormous to be stored on a hard drive. Therefore, it was decided to restructure the data according to existing Corps of Engineers Division boundaries. This method worked for some of the data but data for some areas (e.g., California) could not be placed on one diskette. This problem was solved by using PKZIP software. This software compresses large files, thus allowing more data to be stored on a diskette. All LEO database files are in the ZIP format.

The Corps Division data file, i.e., the ZIP file, should be stored in the same directory as the LEO Program's executable file. A subdirectory named **DATA** also should be created. This subdirectory will contain the data file the user creates while executing the LEO Program.

Statistical reports can be viewed on a screen or output can be sent to a printer. Previously, printed output went to a high-speed printer with 132 columns. To adjust for the more common 80-column PC printer, output is now printed onto two subsequent pages.

6

3 Functions of the LEO PC Data Retrieval and Analysis System

The following paragraphs give a complete description of the LEO PC Data Retrieval System functions and the interaction needed to complete the function. The **LEO MAIN MENU** screen is displayed as follows:

```
                    ==========================
                    ====LEO MAIN MENU========
                    ==========================
OPTION                   FUNCTION
  1)          IDENTIFY LEO DATA FOR SUBSEQUENT ANALYSIS & REPORTING
  2)          GENERATE REPORT TO USER'S TERMINAL OR PRINTER
  3)          FILE UTILITY MENU
<CR>          END LEO SESSION ("<CR>" IS A CARRIAGE RETURN)
HELP          EXPLANATIONS FOR ALLOWABLE INPUT/PROGRAM OPTIONS
```

Helpful explanations are given whenever the user types HELP in response to certain function actions. A sample session can be found in Appendix A.

Identifying and Retrieving LEO PC Data

The "option 1" function is used to identify and retrieve any subset of the database that is needed for subsequent analysis and report processing. The data file or uncompressed zip file must be in the same directory as the LEO Program. The newly created data file will be stored in a subdirectory named DATA.

Site number

A specific site can be identified by a preassigned five-digit site number. A list of LEO locations with their corresponding site numbers is available upon request from the PC. A LEO site listing can also be found in Appendix B.

Time period

After the location is selected, the user is shown the year(s) during which LEO data were collected for this location. The required time period must be identified and then extracted from the database and stored on a hard disk file. The identifying process is done by entering the last two digits of the year using any one of the following entry formats to define the period:

```
a.        Single Year          - YR
b.        Multiple Years       - YR YR YR ....
c.        Continuous Years     - YR-YR
```

A blank is typed between each period when requesting data for 2 or more years. A dash is typed between two periods when requesting a continuous period of years.

Unique file name

The disk file, created from the "option 1" function of the MAIN MENU, will contain the extracted data and should have a unique file name. Remember, this file will be stored in the subdirectory DATA. If a file already exists with that identical name, a message is printed on the screen. Also, if the user deleted a file name using "option 2" of the UTILITY MENU and reused that file name in the same session, a message will appear stating that file already exists. The user must log out of the LEO session and reenter in order to reuse a file name.

Once data have been extracted and given a unique file name, the user can either request the identification and retrieval of another data set or end the function.

Generating Report
to User's Terminal or Printer

Function "option 2" is used to generate reports to the PC screen or printer. This program's predecessor allowed for 132-column printers, thereby displaying wide reports. This version, however, replaces those printers with 80-column printers, thus displaying some reports on two pages.

By typing a "2" at the "Main Menu" function, a list of available reports from the **REPORT MENU** will be displayed on the screen along with a program-issued prompt requesting report selection. Available reports are listed below:

```
1.    Table Showing Days When LEO Observations Were Made
2.    Daily LEO Observation Records
3.    Summary Tables of Surf, Wind, Sediment Transport, & Beach Stats
4.    Percent Occurrence of Wave Period VS Wave Height
5.    Percent Occurrence of Wind Speed VS Wind Direction
6.    All of the Above
7.    LEO Site Listing To Screen
H.    Help With Reports
<CR> Return to Main Menu
```

These reports are explained in more detail in Chapter 5 of this report. The user selects the report by entering the number corresponding to the desired report. A blank between each identifying number must be typed when requesting more than one report. A brief description of each report can be displayed to the screen when the user requests HELP.

Following the selection of reports, the user must identify the LEO data file to be used as input for the report. Remember, this file must exist in the user's subdirectory DATA. Report output can be sent to the screen or the printer upon the user's request.

If the user selects "3," "Summary Tables," a **SUMMARY TABLES MENU** will be displayed listing all available reports. Report selections are as follows:

```
1.      Surf Observations Summary
2.      Wind Observations Summary
3.      Current Observations Summary
4.      Sediment Transport Volume Summary
5.      Beach Width Observation Summary
6.      All of the Above
<CR>    Return to Report Menu
```

The procedure for selecting a summary table is identical to that for se-
lecting reports from the **REPORT MENU**. HELP is accessible at any
time during this process.

File Utility Menu

The "option 3" function of the "**MAIN MENU**" is a new addition to
the program. This function allows the user to housekeep files without
ending the LEO session. The **UTILITY MENU** appears on   een as
follows:

```
1.        List Files in \LEO\DATA
2.        Delete File(s) in \LEO\DATA
3.        Move Data From Floppy Disk to System
4.        Move Data To Floppy Disk
<CR>      Return To Main Menu
```

Each selection in the menu is self-explanatory; when in doubt, the user
types HELP.

Ending the LEO Session

At the "MAIN MENU" level, a carriage return (<CR>) typed in re-
sponse to the function selection prompt ends the LEO PC Data Retrieval
and Analysis System Session.

4 Procedure for Using Newly Acquired LEO Data with LEO PC Data Retrieval and Analysis System

Users may have the opportunities to acquire new LEO data, in which case, certain procedures need to be followed to prepare data for input into the LEO PC Data Retrieval and Analysis System.

ASCII Data File

An ASCII data file should be created from the new LEO data, using an MS-DOS editor or word processor. This file contains the exact information recorded on the LEO form. Data in the ASCII file begin on row 1, column 1 with a five-digit site number and end in column 60 with a four-digit beach width. Extreme care should be taken when copying data from the LEO form into an ASCII file. It is imperative that each block of data on the LEO form be placed into its corresponding column in the ASCII file, thereby preventing incorrect data from being used in the LEO PC Data Retrieval and Analysis Program. Following is an excerpt of the first line (taken from a LEO data file) of the Indian Beach Park, Florida, site:

```
12064770719 930 42  5110175410  35  20     11-1    0   03
```

After a new file has been created, place it in the same directory with the LEO program, as described in Chapter 3 of this report in the section titled "Identifying and Retrieving LEO PC Data."

Unique Site Number

The user must give the newly acquired LEO data a unique five-digit
site number. It is important for this number to be different from all existing
site numbers, in order to prevent the user from obtaining erroneous data
for a specific site location.

LEO Site Directory

Once a unique site number has been assigned, the user must place this
number and new site location name in the existing LEO site directory file
name, **leosite.dat**. This can be accomplished by using an MS-DOS editor
or a word processor. Be sure this new site number is placed in numerical
order with other existing site numbers. Without the new LEO site directory,
the program will not display a new site location when asked for a listing.
The user can still obtain data, but the new site number must be given when
prompted by the program as opposed to inquiring for a listing. Refer to
Chapter 3 of this report in the section titled "Generating Report to User's
Terminal or Printer," for instructions on how to obtain LEO site listings.

5 LEO Statistical Reports

The LEO PC Data Retrieval and Analysis System produces five reports obtained from five statistical programs. Each report contains the report's title, location, site number, latitude, and longitude.

The PC retrieval system restricts screen report output to 22 lines per screen. Reports printed on a printer differ from the ones displayed on the screen in format only. This program-controlled interrupt offers time to view each report and gives an opportunity to discontinue the report display.

Daily LEO Observations

The "Daily LEO Observations" report provides a formatted listing of the LEO recording form. Data parameters provided in the report are wave period, wave height, wind speed and direction, shore slope, width of surf, distance of dye thrown, and longshore current. These are displayed by date and time of observation.

Days LEO Observations Were Taken

The report titled "Graph Showing Days When LEO Observations Were Taken" is a graphic representation of days when observations were made during the month for a particular year. Also included are the number of observations made for the month and for the entire time period. An example is shown on page A7.

Surf, Wind, Sediment Transport, and Beach Width Summary Table

The report titled "Summary Table of Surf, Wind, Sediment Transport, and Beach Width" is a collection of five separate summary tables. The tables can be displayed to the screen or printer as a one-subject, stand-alone report, or may be grouped into one report containing all five tables. The five summary tables are described below.

Surf observations

The surf observations report displays the number of monthly observations, average wave height, average wave period, and number of observations made in calm conditions. It also shows the percent occurrence of the approach of the waves to the shoreline categorized by an angle which is less than, greater than, or equal to 90 deg[1] (angle increases clockwise, while observer looks oceanward). The report also gives averages for all the surf data acquired during the year. An example of this report can be found on page A10.

Wind observation

The wind observations report summarizes monthly averages of wind speed and percent occurrence of wind coming from a specific direction such as north, southeast, etc. An average for all wind data acquired during the year is also printed. An example of this report can be found on page A13.

Current observation

The current observations report gives monthly averages, population standard deviation, and number of observations made for current movement to the left and current movement to the right. It also gives the monthly net current averages and the number of observations made. An example of this report can be found on page A16.

Sediment transport volume

The sediment transport volume report provides monthly net, gross left, and gross right transport volumes. Two methods, described in Section IV of the *Shore Protection Manual*, are used to calculate transport volume.

---

[1] A table of factors for converting non-SI units of measurement to SI units is presented on page v.

Yearly volume is calculated by summing monthly values. An example of this report can be found on page A19.

Beach width

The beach width report provides a monthly total of beach width observations, average width per month, and the sample standard deviation of the observations that month. There is also a yearly total of each category given.

Percent Occurrence of Wave Period Versus Wave Height

The report titled "Percent Occurrence of Wave Period vs Wave Height" is a tabular grid of percent occurrence of waves by height and period for all possible wave directions. Period is presented in columnar order at 1-sec intervals, with the last being 21. Height is displayed in row format at 1-ft intervals, with the highest row corresponding to a 12-ft and higher (12+) wave. An example of this report can be found on page A22.

Percent Occurrence of Wind Speed Versus Wind Direction

The report titled "Percent Occurrence of Wind Speed vs Wind Direction" is a tabular grid of percent occurrence of winds by speed and direction. Direction is presented in columnar format such as north, northeast, etc. Speed is presented in row order at 2-mph intervals, with the highest row representing speeds greater than or equal to 30 mph (30+). An example of this report can be found on page A25.

6 Summary

The LEO Retrieval System was moved to the PC in order to make the program more easily accessible to all Corps users. The LEO PC Data Retrieval and Analysis System is a user-friendly, menu-driven, LAHEY F77L FORTRAN program for retrieval, analysis, and report processing of wave, wind, current, sand movement and beach width data. There are presently over 350 LEO observation sites along U.S. coastlines.

LEO information collected has been placed in a database and archived onto 3.5-in. IBM-compatible diskettes. Data are categorized according to existing Corps District boundaries. These diskettes will soon be readily available to each District representative.

Two major changes to the LEO Program have greatly enhanced its usability. First, the LEO recording form is no longer a CERC-issued form. It can be reproduced from the PC by using WordPerfect 5.1 software. However, before printing the form, the printer setup must be changed to display an HP LaserJet Series II. If the form needs to be altered, it can be readily done without any difficulty. The user, however, needs to remember that the program will need to be updated to accept the changes made to the altered form. The second change to the LEO Program is the incorporation of the beach width parameter into the form. Existing LEO data files do not have beach width data; therefore, no values would be in the beach width report.

The LEO PC Data Retrieval and Analysis System is menu-driven. The Data Retrieval System gives the user the capability of creating a subset of the LEO database and placing that information in a file for later use. The Analysis System analyzes the subset of LEO data and provides printed reports to the screen or printer upon the user's request. The HELP option is always available to the user throughout the session.

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Appendix A
Sample Session for LEO PC Data
Retrieval and Analysis

Information presented on the following pages demonstrates how a user would ascertain several reports from the LEO PC Analysis System and also become familiar with the HELP function.

To begin the session, the user must be in the LEO directory, and type LEOGO.

```
THE FOLLOWING COMMAND MUST BE IN YOUR CONFIG.SYS FILE FOR THIS
             SYSTEM TO WORK:   DEVICE=\DOS\ANSI.SYS



              BE SURE TO HAVE YOUR CAPS LOCK ON !!!



      PRESS ENTER TO CONTINUE OR <CTRL>Z TO EXIT >>




                    ==========================
                    === LEO MAIN MENU ===
                    ==========================

 OPTION                      FUNCTION


   1)       IDENTIFY LEO DATA FOR SUBSEQUENT ANALYSIS & REPORTING
   2)       GENERATE REPORT TO USER'S TERMINAL OR PRINTER
   3)       FILE UTILITY MENU
  <CR>      END LEO SESSION ("<CR>" IS A CARRIAGE RETURN)
  HELP      EXPLANATIONS FOR ALLOWABLE INPUT/PROGRAM OPTIONS



       OPTION >> 1
```

```
          THE MASTER FILE MUST BE IN "\LEO"




     LEO MASTER FILE NAME >>
```

```
LEO MASTER FILE NAME >> jflo.dat
```

```
ENTER LEO SITE NUMBER (OR "ALL" TO SEE ALL SITE NUMBERS) >> 12081

LEO DATA FOR SITE NUMBER 12081 IS AVAILABLE FOR THESE YEARS:
>  80 81
ENTER YEAR(S) DESIRED ("H" FOR HELP) >> 80
ENTER A UNIQUE FILE NAME FOR SITE DATA >> august.dat
```

```
          YOUR REQUESTED DATA IS BEING EXTRACTED FROM
          THE MASTER FILE.  LEO DATA FILE(S) WITH THE
          UNIQUE DATA NAME(S) THE USER HAS CHOSEN WILL
          APPEAR IN A DOS DIRECTORY LISTING KNOWN AS

                        "\LEO\DATA"


               PRESS <CR> TO CONTINUE >>




            ═══════════════════════════
            ─── LEO MAIN MENU ───
            ═══════════════════════════


   OPTION                      FUNCTION


     1)        IDENTIFY LEO DATA FOR SUBSEQUENT ANALYSIS & REPORTING
     2)        GENERATE REPORT TO USER'S TERMINAL OR PRINTER
     3)        FILE UTILITY MENU
    <CR>       END LEO SESSION ("<CR>" IS A CARRIAGE RETURN)
    HELP       EXPLANATIONS FOR ALLOWABLE INPUT/PROGRAM OPTIONS




         OPTION >> 2
```

```
          === REPORT MENU ===

1) TABLE SHOWING DAYS WHEN LEO OBSERVATIONS WERE MADE
2) DAILY LEO OBSERVATION RECORDS
3) SUMMARY TABLES OF SURF, WIND, SEDIMENT TRANSPORT, & BEACH STATS
4) PERCENT OCCURRENCE OF WAVE PERIOD VS WAVE HEIGHT
5) PERCENT OCCURRENCE OF WIND SPEED VS WIND DIRECTION
6) ALL OF THE ABOVE
7) LEO SITE LISTING TO SCREEN
H) HELP WITH REPORTS
<CR> RETURN TO MAIN MENU


        OPTION >> 1
```

TABLE SHOWING DAYS WHEN LEO OBSERVATIONS WERE MADE

ENTER NAME OF OBSERVATION DATA FILE >> AUGUST.DAT

```
1 -- WRITE OUTPUT TO PRINTER
2 -- WRITE OUTPUT TO SCREEN
TO STOP REPORT: TYPE <CTRL> Z & <CR>
ENTER >> 2
```

```
                DAYS WHEN LEO OBSERVATIONS WERE TAKEN
                 (12081)ST. AUGUSTINE            ,FLORIDA
                LATITUDE??? ????? - LONGITUDE ??? ?????


                           1980
                   1111111111222222222233
                   12345678901234567890123456789 01
        JAN                               *   ***       4
        FEB * ******   ** * *****   ** *               18
        MAR *  ** ******      **                       11
        APR                                             0
        MAY                                             0
        JUN                     ************           12
        JUL *******************************            31
        AUG **** **** *  ******** *****                22
        SEP *******    ** *  ******* **               19
        OCT **    * **  ****                            9
        NOV        *  **  * *    ** *   *               9
        DEC **     * *   ********    ******            18
        * ONE OBSERVATION,   > TWO OBSERVATIONS

    153 OBSERVATIONS DURING THE PERIOD  1-25-80 TO 12-31-80


  LAST REPORT IN THIS CATEGORY ---- WHEN READY TO PROCEED: TYPE <CR> >>
```

```
        === REPORT MENU ===

1) TABLE SHOWING DAYS WHEN LEO OBSERVATIONS WERE MADE
2) DAILY LEO OBSERVATION RECORDS
3) SUMMARY TABLES OF SURF, WIND, SEDIMENT TRANSPORT, & BEACH STATS
4) PERCENT OCCURRENCE OF WAVE PERIOD VS WAVE HEIGHT
5) PERCENT OCCURRENCE OF WIND SPEED VS WIND DIRECTION
6) ALL OF THE ABOVE
7) LEO SITE LISTING TO SCREEN
H) HELP WITH REPORTS
<CR> RETURN TO MAIN MENU


        OPTION >> 3




        === SUMMARY TABLES MENU ===

1) SURF OBSERVATIONS SUMMARY
2) WIND OBSERVATIONS SUMMARY
3) CURRENT OBSERVATIONS SUMMARY
4) SEDIMENT TRANSPORT VOLUME SUMMARY
5) BEACH WIDTH OBSERVATION SUMMARY
6) ALL OF THE ABOVE
<CR> RETURN TO REPORT MENU



ENTER OPTION NUMBER (OR "H" FOR HELP) >> 1
```

```
          SUMMARY TABLE OF SURF, WIND, SEDIMENT TRANSPORT, & BEACH STATS



     ENTER NAME OF DATA FILE >> AUGUST.DAT









          1 -- WRITE OUTPUT TO PRINTER
          2 -- WRITE OUTPUT TO SCREEN
          TO STOP REPORT: TYPE <CTRL> Z & <CR>
          ENTER >> 1
```

```
SURF OBSERVATIONS SUMMARY              DATA COLLECTED FROM 25 JAN 80 TO 31 DEC 80
(12081) ST. AUGUSTINE, FLORIDA                    LAT??? ????? - LONG ??? ?????

MON  NUMBER   CALM    AVERAGE   AVERAGE    ---PERCENT OCCURRENCE---      AVG.   NUM
      OBS.    OBS.    HEIGHT    PERIOD    NUM    >90     =90    <90      ZONE   OBS
                      (FT)(1)   (SEC)(1)                                (FT)(2)
JAN     4      0       1.63     10.32      0    0.0     0.0    0.0        41     4
FEB    18      0       2.82      8.21      0    0.0     0.0    0.0        36    18
MAR    10      0       2.25      8.90      0    0.0     0.0    0.0        34    11
APR     0      0       0.00      0.00      0    0.0     0.0    0.0         0     0
MAY     0      0       0.00      0.00      0    0.0     0.0    0.0         0     0
JUN    12      0       1.66      9.44      0    0.0     0.0    0.0       169    12
JUL    29      0       2.26      9.24      0    0.0     0.0    0.0       262    29
AUG    22      0       2.61      9.71      0    0.0     0.0    0.0       338    22
SEP    19      0       2.76      8.52      0    0.0     0.0    0.0       435    19
OCT     9      0       2.61     10.61      0    0.0     0.0    0.0       244     9
NOV     9      0       2.22      9.51      0    0.0     0.0    0.0       319     9
DEC    18      0       2.40     13.96      0    0.0     0.0    0.0       318    18

YR    150      0       2.41      9.78      0    0.0     0.0    0.0       247   151
(1) CALMS NOT INCLUDED IN AVERAGE CALCULATION.
(2) CURRENT MOVEMENT INDICATORS:  MINUS SIGN (-) = LEFT;  NO SIGN = RIGHT.
```

```
        ━━━ REPORT MENU ━━━

1) TABLE SHOWING DAYS WHEN LEO OBSERVATIONS WERE MADE
2) DAILY LEO OBSERVATION RECORDS
3) SUMMARY TABLES OF SURF, WIND, SEDIMENT TRANSPORT, & BEACH STATS
4) PERCENT OCCURRENCE OF WAVE PERIOD VS WAVE HEIGHT
5) PERCENT OCCURRENCE OF WIND SPEED VS WIND DIRECTION
6) ALL OF THE ABOVE
7) LEO SITE LISTING TO SCREEN
H) HELP WITH REPORTS
<CR> RETURN TO MAIN MENU


        OPTION >> 3




        ━━━ SUMMARY TABLES MENU ━━━

1) SURF OBSERVATIONS SUMMARY
2) WIND OBSERVATIONS SUMMARY
3) CURRENT OBSERVATIONS SUMMARY
4) SEDIMENT TRANSPORT VOLUME SUMMARY
5) BEACH WIDTH OBSERVATION SUMMARY
6) ALL OF THE ABOVE
<CR> RETURN TO REPORT MENU



ENTER OPTION NUMBER (OR "H" FOR HELP) >> 2
```

```
        SUMMARY TABLE OF SURF, WIND, SEDIMENT TRANSPORT, & BEACH STATS



    ENTER NAME OF DATA FILE >> AUGUST.DAT












    1 -- WRITE OUTPUT TO PRINTER
    2 -- WRITE OUTPUT TO SCREEN
    TO STOP REPORT: TYPE <CTRL> Z & <CR>
    ENTER >> 1
```

```
WIND OBSERVATIONS SUMMARY                DATA COLLECTED FROM 25 JAN 80 TO 31 DEC 80
(12061) ST. AUGUSTINE, FLORIDA                     LAT??? ????? - LONG ??? ?????
```

MON	NUM OBS	AVG SPEED (MPH)(1)	NORTH	N. EAST	EAST	S. EAST	SOUTH	S. WEST	WEST	N. WEST	CALM
JAN	4	7.3	0.0	75.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0
FEB	18	7.6	44.4	16.7	0.0	11.1	0.0	11.1	5.6	11.1	0.0
MAR	11	3.9	0.0	27.3	0.0	18.2	0.0	0.0	0.0	27.3	27.3
APR	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAY	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JUN	12	7.3	0.0	25.0	0.0	33.3	0.0	8.3	16.7	0.0	16.7
JUL	29	7.5	0.0	10.3	20.7	37.9	3.4	3.4	17.2	0.0	6.9
AUG	22	8.3	0.0	27.3	27.3	40.9	4.5	0.0	0.0	0.0	0.0
SEP	19	8.7	0.0	52.6	21.1	21.1	0.0	0.0	0.0	0.0	5.3
OCT	9	7.4	0.0	44.4	22.2	11.1	0.0	0.0	0.0	0.0	22.2
NOV	9	5.1	0.0	55.6	11.1	0.0	0.0	0.0	0.0	0.0	33.3
DEC	18	5.7	22.2	11.1	11.1	5.6	0.0	5.6	0.0	38.9	5.6
YR	151	7.1	7.9	27.8	13.9	22.5	1.3	4.0	5.3	7.9	9.3

(1) CALMS, IF ANY INCLUDED IN AVERAGE CALCULATION.

```
            === REPORT MENU ===

1) TABLE SHOWING DAYS WHEN LEO OBSERVATIONS WERE MADE
2) DAILY LEO OBSERVATION RECORDS
3) SUMMARY TABLES OF SURF, WIND, SEDIMENT TRANSPORT, & BEACH STATS
4) PERCENT OCCURRENCE OF WAVE PERIOD VS WAVE HEIGHT
5) PERCENT OCCURRENCE OF WIND SPEED VS WIND DIRECTION
6) ALL OF THE ABOVE
7) LEO SITE LISTING TO SCREEN
H) HELP WITH REPORTS
<CR> RETURN TO MAIN MENU


        OPTION >> 3




            === SUMMARY TABLES MENU ===

1) SURF OBSERVATIONS SUMMARY
2) WIND OBSERVATIONS SUMMARY
3) CURRENT OBSERVATIONS SUMMARY
4) SEDIMENT TRANSPORT VOLUME SUMMARY
5) BEACH WIDTH OBSERVATION SUMMARY
6) ALL OF THE ABOVE
<CR> RETURN TO REPORT MENU



ENTER OPTION NUMBER (OR "H" FOR HELP) >> 3
```

```
                SUMMARY TABLE OF SURF, WIND, SEDIMENT TRANSPORT, & BEACH STATS




        ENTER NAME OF DATA FILE >> AUGUST.DAT















            1 -- WRITE OUTPUT TO PRINTER
            2 -- WRITE OUTPUT TO SCREEN
            TO STOP REPORT: TYPE <CTRL> Z & <CR>
            ENTER >> 1
```

```
CURRENT OBSERVATIONS SUMMARY          DATA COLLECTED FROM 25 JAN 80 TO 31 DEC 80
(12081) ST. AUGUSTINE, FLORIDA                    LAT??? ????? - LONG ??? ?????

MON    NUMBER ----CURRENT TO LEFT----      ---CURRENT TO RIGHT---     -NET CURRENT-
       CALM   AVERAGE   STANDARD  NUM       AVERAGE   STANDARD NUM     AVERAGE    NUM
       OBS.    (1)       DEV.     OBS        (1)       DEV.    OBS      (1,2)      OBS
JAN     0     -0.43      0.27      2         1.44      1.26     2        0.51       4
FEB     1     -0.58      0.35      2         1.02      0.62    14        0.82      16
MAR     2     -0.39      0.24      5         0.60      0.59     4        0.05       9
APR     0      0.00      0.00      0         0.00      0.00     0        0.00       0
MAY     0      0.00      0.00      0         0.00      0.00     0        0.00       0
JUN     0     -1.26      0.53      9         1.08      1.17     3       -0.68      12
JUL     0     -1.34      0.70     25         1.97      0.00     1       -1.21      26
AUG     0     -1.59      0.61     16         2.38      1.08     6       -0.51      22
SEP     0     -1.30      0.71     14         1.17      0.85     5       -0.65      19
OCT     0     -1.73      0.66      5         2.91      1.31     4        0.33       9
NOV     0     -0.99      0.80      5         0.38      0.32     4       -0.39       9
DEC     0     -0.63      0.59      2         1.12      0.62    15        0.92      17

YR      3     -1.26      0.70     85         1.29      0.98    58       -0.23     143
(1) CALMS NOT INCLUDED IN AVERAGE CALCULATION.
(2) CURRENT MOVEMENT INDICATORS:  MINUS SIGN (-) = LEFT;  NO SIGN = RIGHT.
```

```
        === REPORT MENU ===

1) TABLE SHOWING DAYS WHEN LEO OBSERVATIONS WERE MADE
2) DAILY LEO OBSERVATION RECORDS
3) SUMMARY TABLES OF SURF, WIND, SEDIMENT TRANSPORT, & BEACH STATS
4) PERCENT OCCURRENCE OF WAVE PERIOD VS WAVE HEIGHT
5) PERCENT OCCURRENCE OF WIND SPEED VS WIND DIRECTION
6) ALL OF THE ABOVE
7) LEO SITE LISTING TO SCREEN
H) HELP WITH REPORTS .
<CR> RETURN TO MAIN MENU


        OPTION >> 3




        === SUMMARY TABLES MENU ===

1) SURF OBSERVATIONS SUMMARY
2) WIND OBSERVATIONS SUMMARY
3) CURRENT OBSERVATIONS SUMMARY
4) SEDIMENT TRANSPORT VOLUME SUMMARY
5) BEACH WIDTH OBSERVATION SUMMARY
6) ALL OF THE ABOVE
<CR> RETURN TO REPORT MENU



ENTER OPTION NUMBER (OR "H" FOR HELP) >> 4
```

```
            SUMMARY TABLE OF SURF, WIND, SEDIMENT TRANSPORT, & BEACH STATS



      ENTER NAME OF DATA FILE >> AUGUST.DAT











         1 -- WRITE OUTPUT TO PRINTER
         2 -- WRITE OUTPUT TO SCREEN
         TO STOP REPORT: TYPE <CTRL> Z & <CR>
         ENTER >> 1
```

SEDIMENT TRANSPORT VOLUME SUMMARY   DATA COLLECTED FROM 25 JAN 80 TO 31 DEC 80
(12081) ST. AUGUSTINE, FLORIDA   LAT??? ????? - LONG ??? ?????

| MON | METHOD1 | | GROSS LEFT | | GROSS RIGHT | |
	CU YD	OBS	CU YD	OBS	CU YD	OBS
JAN	32632(	4)	-704(	1)	33336(	3)
FEB	178586(	18)	-1596(	1)	180182(	11)
MAR	72411(	10)	-4752(	3)	77164(	2)
APR	0(	0)	0(	0)	0(	0)
MAY	0(	0)	0(	0)	0(	0)
JUN	9208(	12)	0(	0)	9208(	10)
JUL	1500(	29)	-10960(	12)	12461(	14)
AUG	-49793(	22)	-75113(	10)	25320(	9)
SEP	13291(	19)	-30030(	5)	43321(	12)
OCT	42034(	9)	-4862(	2)	46897(	6)
NOV	6750(	9)	-2083(	2)	8833(	3)
DEC	-79153(	18)	-86956(	10)	7802(	3)
YR	227466(	150)	-217056(	46)	444524(	73)

NUMBERS IN PARENTHESES REPRESENT NUMBER OF OBSERVATIONS PER CATEGORY

| MON | METHOD2 | | GROSS LEFT | | GROSS RIGHT | |
	CU YD	OBS	CU YD	OBS	CU YD	OBS
JAN	2267(	4)	-1378(	2)	3645(	2)
FEB	11953(	16)	-635(	2)	12589(	14)
MAR	3403(	9)	-1962(	5)	5366(	4)
APR	0(	0)	0(	0)	0(	0)
MAY	0(	0)	0(	0)	0(	0)
JUN	-16883(	12)	-25276(	9)	8393(	3)
JUL	-75427(	26)	-82282(	25)	6854(	1)
AUG	-34381(	22)	-110971(	16)	76590(	6)
SEP	-73329(	19)	-106459(	14)	33130(	5)
OCT	-12823(	9)	-91749(	5)	78926(	4)
NOV	-44813(	9)	-56012(	5)	11199(	4)
DEC	146126(	17)	-1078(	2)	147205(	15)
YR	-93907(	143)	-477802(	85)	383897(	58)

NUMBERS IN PARENTHESES REPRESENT NUMBER OF OBSERVATIONS PER CATEGORY

```
        ━━━ REPORT MENU ━━━

1) TABLE SHOWING DAYS WHEN LEO OBSERVATIONS WERE MADE
2) DAILY LEO OBSERVATION RECORDS
3) SUMMARY TABLES OF SURF, WIND, SEDIMENT TRANSPORT, & BEACH STATS
4) PERCENT OCCURRENCE OF WAVE PERIOD VS WAVE HEIGHT
5) PERCENT OCCURRENCE OF WIND SPEED VS WIND DIRECTION
6) ALL OF THE ABOVE
7) LEO SITE LISTING TO SCREEN
H) HELP WITH REPORTS
<CR> RETURN TO MAIN MENU


        OPTION >> 4




                PERCENT OCCURRENCE OF WAVE PERIOD VS WAVE HEIGHT




ENTER NAME OF DATA FILE >> AUGUST.DAT
```

```
1 -- WRITE OUTPUT TO PRINTER
2 -- WRITE OUTPUT TO SCREEN
TO STOP REPORT: TYPE <CTRL> Z & <CR>
ENTER >> 1
```

```
                    LITTORAL ENVIRONMENT OBSERVATIONS (LEO)
                  PERCENT OCCURRENCE OF WAVE PERIOD VS WAVE HEIGHT
                      SITE : (12081) ST. AUGUSTINE, FLORIDA
                    DATA COLLECTED FROM 25 JAN 80 TO 31 DEC 80
```

FEET	0	1	2	3	4	5	6	7	8	9	10	11	12	PCT
--------	0.9	1.9	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	10.9	11.9	+	
SECONDS														
0- 2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3- 3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4- 4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5- 5.9	0.0	0.7	2.0	0.7	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	4.0
6- 6.9	0.0	2.0	2.7	2.0	1.3	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0
7- 7.9	0.0	7.3	4.0	3.3	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.3
8- 8.9	1.3	3.3	0.7	2.7	1.3	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0
9- 9.9	0.0	5.3	5.3	4.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.3
10-10.9	0.0	3.3	8.0	2.7	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.3
11-11.9	0.0	5.3	2.7	2.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.3
12-12.9	0.0	2.7	2.0	1.3	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.7
13-13.9	0.0	1.3	0.7	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.7
14-14.9	0.0	0.7	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3
15-15.9	0.0	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3
16-16.9	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7
17-17.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18-18.9	0.0	1.3	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0
19-19.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20-20.9	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7
21+	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3
PCT	2.0	34.7	30.0	20.7	9.3	2.7	0.0	0.0	0.7	0.0	0.0	0.0	0.0	

```
     CALM =   0.0 PERCENT (  0 OBSERVATIONS)        TOTAL OBSERVATIONS =   150
```

```
        === REPORT MENU ===

1) TABLE SHOWING DAYS WHEN LEO OBSERVATIONS WERE MADE
2) DAILY LEO OBSERVATION RECORDS
3) SUMMARY TABLES OF SURF, WIND, SEDIMENT TRANSPORT, & BEACH STATS
4) PERCENT OCCURRENCE OF WAVE PERIOD VS WAVE HEIGHT
5) PERCENT OCCURRENCE OF WIND SPEED VS WIND DIRECTION
6) ALL OF THE ABOVE
7) LEO SITE LISTING TO SCREEN
H) HELP WITH REPORTS
<CR> RETURN TO MAIN MENU


        OPTION >> 5





            PERCENT OCCURRENCE OF WIND SPEED VS WIND DIRECTION




ENTER NAME OF DATA FILE >> AUGUST.DAT
```

```
READY PRINTER AND PRESS <CR> >>
```

```
LITTORAL ENVIRONMENT OBSERVATIONS (LEO)
PERCENT OCCURRENCE OF WIND SPEED VS WIND DIRECTION
(12081) ST. AUGUSTINE, FLORIDA
DATA COLLECTED FROM 25 JAN 80 TO 31 DEC 80
```

DIRECTION	N	NE	E	SE	S	SW	W	NW	PERCENT
SPEED (MPH)									
0-> 1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2-> 3.9	0.7	1.4	1.4	2.2	0.7	1.4	0.7	4.3	13.0
4-> 5.9	1.4	3.6	2.9	2.9	0.0	1.4	1.4	1.4	15.2
6-> 7.9	2.2	6.5	2.2	6.5	0.0	0.0	1.4	1.4	20.3
8-> 9.9	1.4	6.5	5.8	7.2	0.0	0.7	1.4	0.7	23.9
10-> 11.9	2.2	5.1	2.2	3.6	0.7	0.0	0.7	0.0	14.5
12-> 13.9	0.0	3.6	0.7	0.0	0.0	0.7	0.0	0.7	5.8
14-> 15.9	0.0	0.7	0.0	1.4	0.0	0.0	0.0	0.0	2.2
16-> 17.9	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.7
18-> 19.9	0.0	1.4	0.0	0.7	0.0	0.0	0.0	0.0	2.2
20-> 21.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22-> 23.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24-> 25.9	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	1.4
26-> 27.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28-> 29.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PERCENT	8.7	30.4	15.2	24.6	1.4	4.3	5.8	8.7	

```
CALM = 8.6 PERCENT ( 13 OBSERVATIONS)    TOTAL OBSERVATIONS = 151
```

```
        === REPORT MENU ===

1) TABLE SHOWING DAYS WHEN LEO OBSERVATIONS WERE MADE
2) DAILY LEO OBSERVATION RECORDS
3) SUMMARY TABLES OF SURF, WIND, SEDIMENT TRANSPORT, & BEACH STATS
4) PERCENT OCCURRENCE OF WAVE PERIOD VS WAVE HEIGHT
5) PERCENT OCCURRENCE OF WIND SPEED VS WIND DIRECTION
6) ALL OF THE ABOVE
7) LEO SITE LISTING TO SCREEN
H) HELP WITH REPORTS
<CR> RETURN TO MAIN MENU


        OPTION >> H
```

```
ENTER THE NUMBER(S) CORRESPONDING TO THE REPORT(S) YOU WISH.
EXAMPLES:

1)  REQUEST FOR ONE REPORT  >>  3
2)  REQUEST FOR MULTIPLE REPORTS, SEPARATING ENTRIES WITH A BLANK  >>  2 3 5

WOULD YOU LIKE TO SEE A DESCRIPTION OF THE REPORTS (Y,N) >> Y
```

```
        EACH REPORT CONTAINS THE REPORT TITLE, LOCATION, SITE
NO., LATITUDE, AND LONGITUDE.  ALL REPORTS MAY BE DIS-
PLAYED ON EITHER THE TERMINAL SCREEN OR PRINTER.  THE
RETRIEVAL SYSTEM RESTRICTS TERMINAL REPORT OUTPUT TO 22
LINES.  THIS PROGRAM-CONTROLLED INTERRUPT OFFERS TIME TO
VIEW EACH REPORT AND GIVES AN OPPORTUNITY TO DISCONTINUE
THE REPORT DISPLAY.
```

THE FOLLOWING REPORTS ARE PRESENTLY AVAILABLE TO USERS OF THE LEO SYSTEM :

1. DAILY LEO OBSERVATIONS - A FORMATTED LISTING OF THE LEO
OBSERVATION FORM. DATA PARAMETERS PROVIDED IN THE REPORT
ARE WAVE PERIOD, WAVE HEIGHT, WIND SPEED AND DIRECTION,
SHORE SLOPE, WIDTH OF SURF, DISTANCE OF DYE THROWN, AND
LONGSHORE CURRENT. THESE ARE DISPLAYED BY DATE AND TIME
OF OBSERVATIONS.

TO CONTINUE DESCRIPTION, TYPE <CR> --- TO EXIT, TYPE <CTRL> Z & <CR> >>

2. TABLE SHOWING DAYS WHEN LEO OBSERVATIONS WERE MADE - A GRAPHIC
REPRESENTATION OF DAYS WHEN OBSERVATIONS WERE MADE DURING THE MONTH
FOR A PARTICULAR YEAR. ALSO INCLUDED ARE THE NUMBER OF OBSERVATIONS
MADE FOR THE MONTH AND FOR THE ENTIRE TIME PERIOD.

3. A SUMMARY TABLE OF SURF, WIND, SEDIMENT TRANSPORT, AND BEACH
STATS - A COLLECTION OF FIVE SEPARATE SUMMARY TABLE REPORTS. IF THE
REPORT IS DISPLAYED AT THE TERMINAL, IT IS PRESENTED AS A ONE-SUBJECT,
STAND-ALONE REPORT. IF A REPORT IS PRINTED AT A HIGH-SPEED PRINTER, IT
COMBINES ALL FIVE OF THE SUMMARY TABLES INTO A SINGLE REPORT. THIS
DIFFERENCE IN FORMAT IS DUE TO THE FACT THAT A 132 CHARACTER LINE CAN
BE PRINTED ON A HIGH-SPEED PRINTER, BUT ONLY 80 CHARACTERS PER LINE
CAN BE DISPLAYED ON A TERMINAL SCREEN. A REPORT IS PRODUCED FOR
EACH YEAR OF DATA IN THE DATA FILE CREATED EARLIER. WHEN THE DATA
CONTAINS MORE THAN ONE YEAR OF DATA, A REPORT IS ALSO PRODUCED
FOR THE ENTIRE TIME PERIOD.

TO CONTINUE DESCRIPTION, TYPE <CR> --- TO EXIT, TYPE <CTRL> Z & <CR> >>

3A. SURF OBSERVATIONS - DISPLAYS NUMBER OF MONTHLY OBSERVATIONS,
AVERAGE HEIGHT, AVERAGE PERIOD, AND NUMBER OF OBSERVATIONS MADE IN
CALM CONDITIONS. IT ALSO SHOWS THE PERCENT OCCURRENCE OF THE APPROACH
OF THE WAVES TO THE SHORELINE CATEGORIZED BY AN ANGLE WHICH IS LESS THAN,
GREATER THAN, OR EQUAL TO 90 DEGREES. THE REPORT ALSO GIVES
AVERAGES FOR ALL THE SURF DATA ACQUIRED DURING THE YEAR.

3B. WIND OBSERVATIONS - SUMMARIZE MONTHLY AVERAGES OF WIND SPEED
AND PERCENT OCCURRENCE OF THE WIND COMING FROM A SPECIFIC DIRECTION
SUCH AS NORTH, SOUTHEAST, ETC. AN AVERAGE FOR ALL WIND DATA
ACQUIRED DURING THE YEAR IS ALSO PRINTED.

3C. CURRENT OBSERVATIONS - GIVE MONTHLY AVERAGES, POPULATION STANDARD
DEVIATION, AND NUMBER OF OBSERVATIONS MADE FOR CURRENT MOVEMENT TO THE
LEFT AND CURRENT MOVEMENT TO THE RIGHT. IT ALSO GIVES THE MONTHLY
NET CURRENT AVERAGES AND THE NUMBER OF OBSERVATIONS MADE.

3D. SEDIMENT TRANSPORT VOLUME - PROVIDE MONTHLY NET, GROSS LEFT,
AND GROSS RIGHT TRANSPORT VOLUMES. TWO METHODS DESCRIBED IN SECTION
FOUR OF THE SHORE PROTECTION MANUAL -SPM- ARE USED TO CALCULATE
TRANSPORT VOLUME. THE YEARLY VOLUME IS CALCULATED BY SUMMING THE
MONTHLY VALUES.

TO CONTINUE DESCRIPTION, TYPE <CR> --- TO EXIT, TYPE <CTRL> Z & <CR> >>

3E. BEACH WIDTH - PROVIDE A MONTHLY TOTAL OF BEACH WIDTH OBSERVA-
TIONS, THE AVERAGE PER MONTH, AND THE SAMPLE STANDARD DEVIATION OF THE
OBSERVATIONS THAT MONTH.   THERE IS ALSO A YEARLY TOTAL IN EACH CATEGORY.

4. PERCENT OCCURRENCE OF WAVE PERIOD VS WAVE HEIGHT - A TABULAR
GRID OF PERCENT OCCURRENCE OF WAVES BY HEIGHT AND PERIOD FOR ALL
POSSIBLE WAVE DIRECTIONS.   PERIOD IS PRESENTED IN COLUMNAR ORDER AT ONE
SECOND INTERVALS, EXCEPT FOR THE LAST BEING 21.   HEIGHT IS DISPLAYED IN
ROW FORMAT AT ONE FOOT INTERVALS, EXCEPT FOR THE LAST BEING 12+.

5. PERCENT OCCURRENCE OF WIND SPEED VS WIND DIRECTION - A
TABULAR GRID REPORTS PERCENT OCCURENCE OF WINDS BY SPEED AND
DIRECTION.   THE DIRECTION IS PRESENTED IN COLUMNAR FORMAT SUCH
AS NORTH, NORTHEAST, ETC.   SPEED IS PRESENTED IN ROW ORDER AT 2 MPH
INTERVALS, EXCEPT FOR THE LAST BEING 30+.

LAST DISPLAY OF REPORT DESCRIPTIONS - TYPE <CR> >>

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=== LEO MAIN MENU ===
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OPTION                      FUNCTION


   1)       IDENTIFY LEO DATA FOR SUBSEQUENT ANALYSIS & REPORTING
   2)       GENERATE REPORT TO USER'S TERMINAL OR PRINTER
   3)       FILE UTILITY MENU
  <CR>      END LEO SESSION ("<CR>" IS A CARRIAGE RETURN)
  HELP      EXPLANATIONS FOR ALLOWABLE INPUT/PROGRAM OPTIONS




        OPTION >> 3




              --- UTILITY MENU ---


OPTION                      FUNCTION


   1)    LIST FILES IN \LEO\DATA
   2)    DELETE FILE(S) IN \LEO\DATA
   3)    MOVE DATA FROM FLOPPY DISK TO SYSTEM
   4)    MOVE DATA TO FLOPPY DISK
  <CR>   RETURN TO MAIN MENU



        OPTION >>
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                    =====================
                    === LEO MAIN MENU ===
                    =====================


    OPTION                        FUNCTION


       1)          IDENTIFY LEO DATA FOR SUBSEQUENT ANALYSIS & REPORTING
       2)          GENERATE REPORT TO USER'S TERMINAL OR PRINTER
       3)          FILE UTILITY MENU
      <CR>         END LEO SESSION ("<CR>" IS A CARRIAGE RETURN)
      HELP         EXPLANATIONS FOR ALLOWABLE INPUT/PROGRAM OPTIONS




            OPTION >> HELP




    THE LEO RETRIEVAL SYSTEM GIVES YOU A FRIENDLY AND CONVENIENT TOOL FOR:

    1) IDENTIFYING RAW LEO DATA FOR A SPECIFIC SITE AND SAVING THAT DATA
       IN A FILE (NAMED BY YOU) IN YOUR USER SPACE. THIS FUNCTION IS USED
       TO IDENTIFY THE DATA SET THAT YOU WILL NEED FOR SUBSEQUENT ANALYSIS
       AND REPORT PROCESSING. INFORMATION ON A SPECIFIC SITE NUMBER IS
       EXTRACTED FROM THE LARGER SITE FILE RESIDING ON YOUR PC.

    2) GENERATING & DISPLAYING LEO REPORT TEXT THAT IS PROCESSED INTERAC-
       TIVELY AS PART OF THE SESSION. IF THIS OPTION IS CHOSEN, THE REPORT
       CAN BE VIEWED AT YOUR TERMINAL OR PRINTER.

    3) PERFORMING VARIOUS FILE UTILITY FUNCTIONS, INCLUDING LISTING
       DATA FILES AND COPYING TO AND FROM THE FLOPPY DRIVE.

    <CR> WILL END THE SESSION.
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                      =======================
                      === LEO MAIN MENU ===
                      =======================


OPTION                          FUNCTION


1)        IDENTIFY LEO DATA FOR SUBSEQUENT ANALYSIS & REPORTING
2)        GENERATE REPORT TO USER'S TERMINAL OR PRINTER
3)        FILE UTILITY MENU
<CR>      END LEO SESSION ("<CR>" IS A CARRIAGE RETURN)
HELP      EXPLANATIONS FOR ALLOWABLE INPUT/PROGRAM OPTIONS



        OPTION >>




                      EXITING LEO RETRIEVAL SYSTEM




C:\LEO>
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Appendix B
LEO Site Directory

LEOSITE DIRECTORY

SITE	LOCATION	STATE	LATITUDE	LONGITUDE
02001	KOTZEBUE WAY	ALASKA	66 52.00	162 33.50
02002	SHORE LANE	ALASKA	000 00.00	000 00.00
02006	NINILCHIK	ALASKA	060 03.10	151 40.00
02007	HOMER SPIT	ALASKA		
02009	HOMER SPIT	ALASKA		
02015	HOMER SPIT	ALASKA		
02016	HOMER SPIT	ALASKA		
02022	HOMER SPIT	ALASKA		
02044	HOMER SPIT	ALASKA		
02054	HOMER SPIT	ALASKA		
05001	NEW BRIGHTON	CALIFORNIA	36 58.72	121 56.10
05002	THORNTON BEACH	CALIFORNIA	37 41.92	122 29.83
05003	FRANCIS BEACH	CALIFORNIA	37 28.05	122 26.81
05004	NATURAL BRIDGES	CALIFORNIA	36 57.02	122 03.48
05005	TWIN LAKES	CALIFORNIA	36 57.70	121 59.76
05006	SEA CLIFF	CALIFORNIA	36 58.17	121 54.73
05007	SUNSET BEACH	CALIFORNIA	36 53.80	121 50.32
05009	SAN SIMEON	CALIFORNIA	35 33.97	121 06.53
05012	PISMO BEACH	CALIFORNIA	35 08.48	120 38.56
05013	EL CAPITAN	CALIFORNIA	34 27.55	120 01.15
05014	CARPENTERIA	CALIFORNIA	34 23.58	119 31.25
05015	SAN BUENAVENTURA	CALIFORNIA	34 16.14	119 16.77
05016	MCGRATH	CALIFORNIA	34 14.18	119 15.89
05017	LEO CARRILLO	CALIFORNIA	34 02.65	118 56.29
05018	BOLSA CHICA	CALIFORNIA	33 41.02	118 02.16
05019	POINT MUGU REC AREA	CALIFORNIA	34 04.70	119 01.70
05020	GOAT ROCK	CALIFORNIA	38 26.76	123 07.54
05021	WRIGHT"S BEACH	CALIFORNIA	38 24.15	123 05.89
05022	STINSON BEACH	CALIFORNIA	37 53.60	122 38.17
05023	MANCHESTER BCH	CALIFORNIA	38 59.03	123 42.39
05024	VAN DAMME BCH	CALIFORNIA	39 16.38	123 47.39
05025	RUSSIAN GULCH	CALIFORNIA	39 19.76	123 46.99
05026	MACKERRICHER	CALIFORNIA	39 29.50	123 47.67
05027	HUNTINGTON BEACH	CALIFORNIA	33 38.81	117 59.23
05028	DOHENY BEACH	CALIFORNIA	33 27.71	117 41.05
05029	SAN CLEMENTE	CALIFORNIA	33 24.12	117 36.25
05030	NORTH CARLSBAD	CALIFORNIA	33 08.82	117 20.72
05031	SOUTH CARLSBAD	CALIFORNIA	33 07.92	117 20.50
05033	SAN ELIJO	CALIFORNIA	33 01.25	117 17.50
05034	TORREY PINES	CALIFORNIA	32 55.74	117 15.74
05035	SILVER STRAND ST PK	CALIFORNIA	32 40.00	117 10.00
05036	PRAIRIE CREEK REDWOODS	CALIFORNIA	41 21.30	124 04.50
05037	LONG BEACH, 65TH PLACE	CALIFORNIA	34 27.87	118 07.63
05110	IMPERIAL BCH SOUTH	CALIFORNIA	32 34.64	117 07.93

SITE	LOCATION	STATE	LATITUDE	LONGITUDE
05120	IMPERIAL BCH NORTH	CALIFORNIA	32 35.17	117 07.89
05140	DEL MAR	CALIFORNIA	32 57.80	117 16.00
05185	BUHNE POINT	CALIFORNIA	40 41.93	124 13.10
05300	NAVARRO	CALIFORNIA	39 11.30	123 45.40
05301	SHELTER COVE	CALIFORNIA	40 01.40	124 03.90
05302	CENTERVILLE BCH	CALIFORNIA	40 34.40	124 21.00
05306	MAD RIVER	CALIFORNIA	40 56.00	124 08.00
05307	REDWOOD CREEK	CALIFORNIA	41 17.00	124 05.57
05310	PELICAN	CALIFORNIA	41 59.56	124 12.50
05313	ENDERTS BEACH	CALIFORNIA	41 42.50	124 08.60
05336	MISSION BEACH	CALIFORNIA	000 00.00	000 00.00
05355	DRAKE'S BEACH	CALIFORNIA	38 01.65	122 57.58
05367	CAPITOLA BEACH	CALIFORNIA	36 58.40	121 56.50
05401	VENTURA SITE 1	CALIFORNIA	34 15.20	119 13.20
05402	VENTURA SITE 2	CALIFORNIA	34 14.60	119 13.10
05403	VENTURA SITE 3	CALIFORNIA	34 14.40	119 13.00
05411	ARROYO BURRO STATE PARK	CALIFORNIA	32 24.00	119 45.00
05412	SHORELINE PARK	CALIFORNIA	34 23.00	119 43.00
05413	LEADBETTER BEACH	CALIFORNIA	34 24.00	119 42.00
05414	EAST BEACH	CALIFORNIA	34 25.00	119 40.00
05417	LOOKOUT PARK	CALIFORNIA	34 25.00	119 39.00
05419	HOLLY AVENUE	CALIFORNIA	34 24.00	119 32.00
05500	BOLINAS	CALIFORNIA	37 54.28	122 41.07
05501	FISHERMAN'S WHARF WEST	CALIFORNIA		
05502	FISHERMAN'S WHARF EAST	CALIFORNIA		
05503	FISHERMAN'S WHARF PIER	CALIFORNIA		
05560	ALAMEDA	CALIFORNIA	37 46.00	122 16.00
05561	SYCAMORE	CALIFORNIA	34 04.15	119 00.72
05562	LINDA LANE	CALIFORNIA	33 25.26	117 37.24
05563	T STREET	CALIFORNIA	33 24.94	117 37.00
05564	CARDIFF FLATS	CALIFORNIA	33 00.81	117 16.81
05565	SOLONA BEACH	CALIFORNIA	33 03.24	117 18.02
05566	ORTEGA	CALIFORNIA	000 00.00	000 00.00
05567	TARAVAL	CALIFORNIA	000 00.00	000 00.00
05568	SLOAT	CALIFORNIA	000 00.00	000 00.00
05569	FULTON	CALIFORNIA	000 00.00	000 00.00
05570	IRVING	CALIFORNIA	000 00.00	000 00.00
05595	CASSIDY STREET	CALIFORNIA	33 10.30	117 21.90
05596	WITHERBY STREET	CALIFORNIA	33 10.70	117 22.20
05597	WISCONSIN TOWER	CALIFORNIA	33 11.00	117 22.60
05598	MUNICIPAL PIER	CALIFORNIA	33 11.70	117 23.00
05599	HARBOR BEACH	CALIFORNIA	000 00.00	000 00.00
05700	NEWPORT BEACH	CALIFORNIA	33 37.10	117 56.27
05701	OFFICER"S PIER	CALIFORNIA	34 05.95	119 05.80
05702	PEG NAVY (PT MUGU)	CALIFORNIA	34 07.18	119 09.50
05703	PEG PIER (CERC)	CALIFORNIA	34 07.18	119 09.50
05704	BALBOA BEACH	CALIFORNIA	33 35.65	117 53.05
05706	PEG 1000" SOUTH	CALIFORNIA	34 07.00	119 09.60

SITE	LOCATION	STATE	LATITUDE	LONGITUDE
05707	PEG 1000" NORTH	CALIFORNIA	34 07.20	119 09.30
05712	SILVER STRAND NORTH	CALIFORNIA	000 00.00	000 00.00
05713	NET-SOUTH	CALIFORNIA	34 09.70	119 13.74
05714	MID-NET	CALIFORNIA	34 09.85	119 13.80
05715	NET-NORTH	CALIFORNIA	34 10.05	119 13.85
05720	MANDALAY BEACH	CALIFORNIA	34 11.87	119 14.83
05725	PIERPONT BAY	CALIFORNIA	34 15.30	119 15.70
05735	HOBSON BEACH	CALIFORNIA	34 20.28	119 24.67
05736	MUSSELL SHOALS	CALIFORNIA	34 21.30	119 26.60
05825	EAST BEACH	CALIFORNIA	34 24.98	119 40.17
05850	LEDBETTER	CALIFORNIA	34 24.13	119 41.77
05994	YELLOW ONE	CALIFORNIA	000 00.00	000 00.00
05995	SAN ONOFRE	CALIFORNIA	000 00.00	000 00.00
05996	OCEANSIDE	CALIFORNIA	000 00.00	000 00.00
05999	BORDERFIELD	CALIFORNIA	32 30.20	117 07.50
09001	SHERWOOD IS POINT	CONNECTICUT	000 00.00	000 00.00
09002	SHERWOOD IS WEST POINT	CONNECTICUT	000 00.00	000 00.00
09003	COMPO COVE FENCE	CONNECTICUT	000 00.00	000 00.00
09004	COMPO COVE WEST	CONNECTICUT	000 00.00	000 00.00
09005	PROSPECT	CONNECTICUT	000 00.00	000 00.00
09006	PUMP STATION	CONNECTICUT	000 00.00	000 00.00
09007	SEAVIEW AVE	CONNECTICUT	000 00.00	000 00.00
09008	SOUTH STREET	CONNECTICUT	000 00.00	000 00.00
10100	PICKERING BEACH	DELAWARE	39 13.00	75 24.00
10101	KITTS HUMMOCK	DELAWARE	39 07.00	75 24.00
10102	BOWERS BEACH	DELAWARE	39 03.00	75 24.00
10103	SLAUGHTER BEACH	DELAWARE	38 55.00	75 20.00
10104	BROADKILL	DELAWARE	38 49.00	75 13.00
10105	LEWES	DELAWARE	38 47.00	75 08.00
10106	INDIAN RIVER INLET	DELAWARE		
12000	PERDIDO KEYS	FLORIDA	30 16.78	87 30.45
12001	K. A. HANNAH	FLORIDA	38 47.00	75 08.00
12002	ATLANTIC BEACH	FLORIDA	000 00.00	000 00.00
12003	SOUTH LAKE WORTH INLET	FLORIDA	26 32.70	80 01.60
12040	SOUTH PALM BEACH	FLORIDA	26 35.58	80 02.25
12041	JUPITER	FLORIDA	26 58.25	80 04.50
12042	BOCA RATON	FLORIDA	26 22.33	80 04.05
12043	HOLLYWOOD	FLORIDA	26 02.50	80 06.80
12044	GOLDEN	FLORIDA	25 57.90	80 07.10
12054	MARINELAND STAD.	FLORIDA	29 40.00	81 12.60
12055	MARINELAND NORTH	FLORIDA	29 40.00	81 12.60
12056	MARINELAND QUALITY	FLORIDA	29 40.00	81 12.60
12057	MARINELAND SOUTH	FLORIDA	29 40.00	81 12.60
12060	HAULOVER	FLORIDA	000 00.00	000 00.00
12062	ALTOS DELMAR	FLORIDA	25 52.00	80 07.00
12063	SMATHERS BEACH	FLORIDA	000 00.00	000 00.00
12064	INDIAN BEACH PARK	FLORIDA	000 00.00	000 00.00
12066	LUMMUS PARK	FLORIDA	000 00.00	000 00.00

SITE	LOCATION	STATE	LATITUDE	LONGITUDE
12067	JENSON 2 NORTH	FLORIDA	27 15.40	80 12.80
12068	JENSON 2 SOUTH	FLORIDA	27 15.20	80 12.70
12069	STUART 3 SOUTH	FLORIDA	27 11.80	80 11.40
12070	MONROE A	FLORIDA	000 00.00	000 00.00
12071	MONROE B	FLORIDA	000 00.00	000 00.00
12072	MONROE C	FLORIDA	000 00.00	000 00.00
12073	MONROE D	FLORIDA	000 00.00	000 00.00
12074	MONROE E	FLORIDA	000 00.00	000 00.00
12080	ANASTASIA REC. AREA	FLORIDA	000 00.00	000 00.00
12081	ST. AUGUSTINE	FLORIDA	000 00.00	000 00.00
12090	SANTA ROSA IS.	FLORIDA	000 00.00	000 00.00
12101	CRYSTAL	FLORIDA	30 23.00	86 26.60
12104	CAMP HELEN	FLORIDA	000 00.00	000 00.00
12105	ST. ANDREWS	FLORIDA	30 05.00	85 40.00
12110	GRAYTON	FLORIDA	30 19.10	86 08.30
12115	J. C. BEASLEY	FLORIDA	30 23.55	86 34.50
12118	NAVARRE	FLORIDA	30 21.50	86 59.40
12120	FT. PICKENS	FLORIDA	30 19.10	87 16.80
12895	REDINGTON SHORES	FLORIDA	27 49.70	82 49.90
12897	PANAMA CITY	FLORIDA	30 12.78	85 52.54
12898	BASIN BAYOU STATE PK.	FLORIDA	30 29.00	86 15.00
12900	MEXICO BEACH,EAST	FLORIDA	30 56.93	85 27.47
12901	MEXICO BEACH,WEST	FLORIDA	30 57.10	85 26.20
13002	SAPELO IS. PROFILE #2	GEORGIA	31 24.13	81 15.58
13005	SAPELO IS. PROFILE #5	GEORGIA	31 23.18	81 16.00
13101	TYBEE LIGHTHOUSE	GEORGIA	32 01.16	80 50.30
13102	DESOTO MOTEL	GEORGIA	32 00.37	80 50.26
13103	POLICE STATION	GEORGIA	31 59.32	80 50.46
13107	NORTH BEACH	GEORGIA	31 05.32	81 24.13
13108	WANDERER	GEORGIA	31 04.08	81 24.22
13109	BUCCANEER	GEORGIA	31 02.28	81 24.80
13110	SOUTH WATER TOWER	GEORGIA	31 00.85	81 25.58
13111	EAST BEACH	GEORGIA	31 09.33	81 21.97
13112	COAST GUARD	GEORGIA	31 08.67	81 22.30
13113	KING AND PRINCE BEACH	GEORGIA	31 08.38	81 22.67
13114	ST. SIMONS SCHOOL	GEORGIA	31 08.08	81 23.08
15001	SUNSET BEACH	HAWAII	21 40.25	158 03.10
15010	HANILEI	HAWAII	22 12.49	159 30.18
15200	BELLOWS AFS	HAWAII	21 23.00	157 43.00
15201	KUALOA	HAWAII	21 31.00	157 50.00
15202	HILO BAY FRONT	HAWAII	000 00.00	000 00.00
17050	SHERIDAN	ILLINOIS	42 13.40	87 48.47
17090	ILLINOIS BEACH	ILLINOIS	42 25.63	87 48.18
18020	CENTRAL	INDIANA	41 42.27	86 57.03
18030	EAST PARK	INDIANA	41 40.92	87 00.60
18040	STATE PARK	INDIANA	41 39.68	87 04.03
18050	OGDEN	INDIANA	41 37.78	87 11.33
22101	HOLLY BEACH	LOUISIANA	29 46.00	93 32.00

SITE	LOCATION	STATE	LATITUDE	LONGITUDE
22102	FONTAINE BLEAU	LOUISIANA	30 18.00	93 21.00
23001	WILLARD BEACH	MAINE	000 00.00	000 00.00
26001	ASSATEAGUE	MARYLAND	38 15.23	75 07.97
26002	ASSATEAGUE NORTH	MARYLAND	38 11.50	75 09.50
26003	ASSATEAGUE SOUTH	MARYLAND	37 53.00	75 20.50
26005	OCEAN CITY, 52ND ST.	MARYLAND		
26009	SMITH ISLAND	MARYLAND	000 00.00	000 00.00
26995	CHESAPEAKE	MARYLAND	000 00.00	000 00.00
26997	POTOMAC	MARYLAND	000 00.00	000 00.00
27004	LECOUNT HOLLOW	MASSACHUSETTS	41 55.30	69 58.56
27005	WASHBURN ISLAND	MASSACHUSETTS	000 00.00	000 00.00
27006	EEL POND	MASSACHUSETTS	000 00.00	000 00.00
27007	BRANT ROCK	MASSACHUSETTS	42 05.00	70 39.00
27008	NAUSET LIGHT	MASSACHUSETTS	41 51.58	69 57.12
28002	NEW BUFFALO	MICHIGAN	41 47.85	86 45.30
28005	WARREN DUNES	MICHIGAN	41 54.00	86 36.40
28010	VAN BUREN	MICHIGAN	42 20.14	86 18.73
28015	HOLLAND	MICHIGAN	42 46.54	86 12.42
28020	GRAND HAVEN	MICHIGAN	43 03.04	86 14.82
28025	HOFFMASTER	MICHIGAN	43 08.13	86 20.88
28030	MUSKEGON	MICHIGAN	43 14.46	86 20.88
28035	SILVER LAKE	MICHIGAN	43 39.38	86 32.13
28040	MEARS	MICHIGAN	43 47.17	86 26.29
28045	LUDINGTON	MICHIGAN	44 02.08	86 30.50
28050	ORCHARD	MICHIGAN	44 18.21	86 18.33
28055	BENZIE (PLATT RIVER)	MICHIGAN	44 43.67	86 07.75
28060	D. H. DAY	MICHIGAN	44 54.00	82 47.00
28065	CHARLEVOIX	MICHIGAN	000 00.00	000 00.00
28280	WELLS	MICHIGAN	45 23.40	87 22.00
28410	PORCUPINE	MICHIGAN	46 49.17	89 38.10
28420	ONTONAGON	MICHIGAN	000 00.00	000 00.00
28430	MCLAIN	MICHIGAN	47 13 67	88 36.65
28450	MARQUETTE	MICHIGAN	000 00.00	000 00.00
28470	MUSKALLONGE	MICHIGAN	46 40.83	85 40.45
28480	TALQUAMENON	MICHIGAN	46 33.50	85 01.40
28490	BRIMELY	MICHIGAN	46 26.83	84 30.15
28630	HOEFT	MICHIGAN	45 27.62	83 52.30
28640	HARRISVILLE	MICHIGAN	44 37.88	83 17.22
28660	TAWAS	MICHIGAN	44 15.56	83 26.50
28670	BAY CITY	MICHIGAN	43 40.00	83 54.00
28675	SLEEPER	MICHIGAN	43 58.00	83 12.70
28690	LAKEPORT	MICHIGAN	43 07.56	82 29.45
28750	METRO	MICHIGAN	42 34.25	82 48.00
28752	PORT SANILAC (SECT. 11)	MICHIGAN	43 24.00	82 31.00
28753	SANILAC (SECT. 26)	MICHIGAN	43 23.00	82 31.00
28850	STERLING	MICHIGAN	41 56.89	83 15.30
30101	HORN IS. GULF	MISSISSIPPI	000 00.00	000 00.00
30103	SHIP IS. GULF	MISSISSIPPI	000 00.00	000 00.00

SITE	LOCATION	STATE	LATITUDE	LONGITUDE
30104	SHIP IS. SOUND	MISSISSIPPI	000 00.00	000 00.00
36001	MANASQUAN INLET	NEW JERSEY	40 06.00	74 02.00
36755	OCEAN CITY	NEW JERSEY	36 15.45	74 36.00
36989	CAPE MAY	NEW JERSEY	38 56.33	74 54.17
38002	90TH ST. ROCKAWAY	NEW YORK	000 00.00	000 00.00
38004	JACOB RIIS PARK 2	NEW YORK	000 00.00	000 00.00
38005	JACOB RIIS PARK 4	NEW YORK	000 00.00	000 00.00
38006	OCEAN BEACH	NEW YORK	000 00.00	000 00.00
38007	WEST HAMPTON	NEW YORK	000 00.00	000 00.00
38008	EAST HAMPTON	NEW YORK	000 00.00	000 00.00
38009	29TH ST. ROCKAWAY	NEW YORK	000 00.00	000 00.00
38010	94TH ST. ROCKAWAY	NEW YORK	000 00.00	000 00.00
38011	145TH ST. ROCKAWAY	NEW YORK	000 00.00	000 00.00
38012	CATTARAUGUS CREEK, SOUTH	NEW YORK	43 33.85	79 08.48
38013	CATTARAUGUS CREEK, NORTH	NEW YORK	42 34.00	79 08.18
38014	CG STATION,300FT EAST	NEW YORK		
38015	GILGO UNDERPASS	NEW YORK		
38016	WEST GILGO	NEW YORK		
38017	PT. LOOKOUT STATION	NEW YORK		
38018	COUNTY STATION	NEW YORK		
38019	LIDO STATION	NEW YORK		
39001	PEA ISLAND	NORTH CAROLINA	35 41.01	75 28.81
39010	SEA CREST	NORTH CAROLINA	36 08.35	75 43.93
39011	DUCK NORTH	NORTH CAROLINA	36 10.92	75 45.05
39012	DUCK PIER	NORTH CAROLINA	36 10.92	75 45.05
39013	DUCK SOUND	NORTH CAROLINA		
39014	AVALON PIER	NORTH CAROLINA	36 02.48	75 43.93
39015	BOGUE SOUND	NORTH CAROLINA		
39017	DUCK 1600 FEET	NORTH CAROLINA		
39019	SOUTHERN SHORES	NORTH CAROLINA	36 08.97	75 44.23
39020	DUCK SOUTH	NORTH CAROLINA		
39098	OCEAN ISLE BEACH	NORTH CAROLINA	33 51.18	78 26.13
39099	SUNSET BEACH	NORTH CAROLINA	33 52.01	78 30.48
39322	CAPE POINT	NORTH CAROLINA		
39562	ATLANTIC BEACH	NORTH CAROLINA		
41001	LAKESHORE PARK 1	OHIO	41 54.45	80 46.85
41002	LAKESHORE PARK 2	OHIO	41 54.48	80 46.70
41003	LAKESHORE PARK 3	OHIO	41 54.48	80 46.58
41004	LAKESHORE PARK 4	OHIO	41 54.52	80 46.37
41008	GENEVA ST. PARK	OHIO	41 51.00	80 59.00
41009	LINWOOD PARK	OHIO	000 00.00	000 00.00
41010	LAKEVIEW PARK	OHIO	000 00.00	000 00.00
41011	MAUMEE STATE PARK	OHIO	000 00.00	000 00.00
41012	PRESQUE ISLE #9	OHIO	000 00.00	000 00.00
43001	FT STEVENS	OREGON	46 11.15	124 00.25
43002	BARVIEW BEACH	OREGON	45 34.58	123 57.33
43003	SOUTH BEACH	OREGON	44 36.50	124 03.70
43004	NYE BEACH	OREGON	44 38.38	124 00.83

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A step-by-step procedure for the operation of the Littoral Environment Observation (LEO) personal computer (PC) Data Retrieval and Analysis System is provided. The program provides a quick and economical means of acquiring littoral environmental data at over 350 sites on the Pacific, Atlantic, and Gulf Coasts, and in the Great Lakes Region.

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LEO (Littoral Environment Observation)   Wave

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